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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/064,542
Filing Date: July 25, 2002
Appellant(s): HEIDER ET AL.

Robert Charles Beam, Esq.
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/1/2007 appealing from the Office action mailed 9/7/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,263,255	Tan et al.	7-2001
6,726,764	Mutti et al.	4-2004

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 31-40 and 45-49 are rejected under 35 USC 102(b) as being anticipated by US Patent 6,263,255 *Tan*.

As regards independent claim 31, *Tan* discloses, *A model base controller comprising: a development environment comprising at least one recipe for a process, each said process defined by a plurality of models* (as regards the controller see Figure 13 "APCDAQ CONTROLLER" Col. 3 lines 25-32 as regards the development environment see Col. 5 lines 44-48 *et seq.* and Figures 14-20 "LABVIEW" and Col. 11 lines 4-16 and Figure 6 reference 630 "APPLICATION INTERFACE " and reference 632 as regards a plurality of models see Figure 2, Figure 5 reference 506, Col. 6 lines 40-48 and Col. 2 lines 58-67), *with each said model corresponding to at least one process step within said recipe* (Figure 4 and Col. 6 lines 24-34 and Col. 1 lines 28-34)*; an execution environment in operative communication with said development environment, and which execution environment comprises an execution platform capable of executing a recipe from said development environment* (Figure 8A and Col. 12 lines 30-42)*; a coordination environment in operative communication with said execution environment and, through said execution environment, with said development environment, and which coordination*

environment coordinates information flow from said execution environment, and through said execution environment, said development environment and said model (Figure 4 "EQUIPMENT INTERFACE #2" and Figures 6 & 7 specifically Figure 6 reference 626 and Figure 8D reference 808 and Figure 14 "DAQDLL" and Figures 15-24 and Col. 13 lines 45-67 and Col. 14 and Col. 15 lines 1-50); *a control level in operative communication with said coordination environment and, through said coordination environment, with said execution environment and said development environment, and in operative communication with at least one controller which is capable of controlling at least one component in the execution of at least one process step as defined by said model and communicated by said coordination environment; and wherein, said controller sends a control command corresponding to a process step defined by said model communicated to said controller from said model within said development environment through said execution environment and through said coordination environment, to said component , and said component sends a component information element to said controller, which component information element is communicated through said coordination environment to said execution environment in which performance of said process step may be varied in accordance with said component information element* (Figures 13-24 and Col. 4 lines 53-67 and Col. 5 lines 1-9 and Col. Col. 8 lines 29-50 the examiner notes that the IDL, Interface Definition Library is used for communications between the development environment, the coordination environment and the actual controller and Col. 7 and Col. 11 lines 17-37). Also see Col. 6 lines 53-67, Col. 7 and Col. 8 lines 1-10.

As regards dependent claim 32 *Tan* discloses, *wherein the coordination of said model with said controller comprises a data flow between said model and said controller* (Col. 5 lines 62-67 and Col. 6 lines 1-8).

As regards dependent claim 33, *Tan* discloses, *wherein said controller is adapted to control a plurality of said at least one components* (Figure 3 reference 304, Figure 4 reference 406, Figure 5 reference 504).

As regards dependent claim 34, *Tan* discloses, *wherein said development environment further comprises a recipe generator communicatively coupled to said plurality of models, and comprising means to add or amend recipes* (Figure 4 and Col. 6 lines 24-34 and Col. 1 lines 28-34 and Figure 7 reference 703, the user can provide recipes).

As regards dependent claim 35, *Tan* discloses, *the model based controller further comprising at least one server being communicatively coupled to said coordination environment* (Figure 15 and Figure 22 "DAQ SERVER").

As regards dependent claim 36, *Tan* discloses, *the model based controller further comprising at least one server being communicatively coupled to said development environment and to said plurality of models* (Figure 15 and Figure 22 "DAQ SERVER").

As regards dependent claim 37, *Tan* discloses, *the model based controller wherein said coordination environment comprises a server* (Figure 15 and Figure 22 "DAQ SERVER").

As regards dependent claim 38, *Tan* discloses, *the model based controller wherein said execution environment further comprises computing resources for real-time control of an execution mode* (Col. 2 lines 7-11).

As regards dependent claim 39, *Tan* discloses, *the model based controller wherein said execution environment further comprises means to display the execution of said process* (Col. 11 lines 4-16).

As regards newly renumbered claim 49, *this is the second claim 39 in applicants' listing; Tan* discloses, *the model based controller wherein said execution environment further comprises means to monitor and control said process* (Col. 11 lines 4-16).

As regards dependent claim 40, *Tan* discloses, *the model based controller wherein said at least one component comprises an operative component selected from the group consisting of a value, a sensor and a motor* (Figure 9 and Col. 16 lines 18-36).

As regards dependent claim 45, *Tan* discloses *the model based controller wherein said execution environment further comprises at least one interface adapted to present information indicative of one of said models and said at least one component to a user* (Col. 11 lines 4-16).

As regards dependent claim 46, *Tan* discloses, *the model based controller further comprising code for enabling said user to employ said interface to modify said model* (Col. 6 lines 42-47).

As regards independent claim 47, *Tan* discloses, *a method of controlling a process, using a model based controller comprising: a development environment comprising at least one recipe for a process, each said process defined by a plurality of models, with each model corresponding to at least one process step with in said recipe;* (as regards the controller see Figure 13 "APCDAQ CONTROLLER" Col. 3 lines 25-32 as regards the development environment see Col. 5 lines 44-48 *et seq.* and Figures 14-20 "LABVIEW" and Col. 11 lines 4-16 and Figure 6 reference 630 "APPLICATION INTERFACE " and reference 632 as regards a plurality of

models see Figure 2, Figure 5 reference 506, Col. 6 lines 40-48 and Col. 2 lines 58-67), *an execution environment in operative communication with said development environment, and which execution environment comprises execution platform capable of executing a recipe from said development environment* (Figure 8A and Col. 12 lines 30-42); *a coordination environment in operative communication with said execution environment and, through said execution environment, with said development environment, and which coordination environment coordinates information flow from said execution environment, and through said execution environment, said development environment and said model* (Figure 4 "EQUIPMENT INTERFACE #2" and Figures 6 & 7 specifically Figure 6 reference 626 and Figure 8D reference 808 and Figure 14 "DAQDLL" and Figures 15-24 and Col. 13 lines 45-67 and Col. 14 and Col. 15 lines 1-50)*; a control level in operative communication environment and, through said coordination environment, with said execution environment and said development environment, and in operative communication with at least one controller which is capable of controlling at least one component in the execution of at least one process step as defined by said model and communicated by said coordination environment; and wherein, said controller sends a control command corresponding to a process step defined by said model communicated to said controller from said model with in said development environment through said execution environment and through said coordination environment, to said component, and said component, and said component sends a component information element to said controller, which component information element is communicated through said coordination environment to said execution environment in which performance of said process step may be varied in accordance with said component information element; which method comprises the steps of:*

selecting a recipe associated with a process having at least one process step; generating a model associated with each process step within said process; issuing at least one control command associated with each model, which control command is communicated by said at least one controller to said at least one component; sending by said at least one component, responsively to said one control command, of at least one component information element to said at least one controller; and communicatively coordinating each said model with the at least one controller, wherein said at least one control command is generated in accordance with the at least one process step, and wherein the at least one process step is varied in accordance with said at least one component information element (Figures 13-24 and Col. 4 lines 53-67 and Col. 5 lines 1-9 and Col. Col. 8 lines 29-50 the examiner notes that the IDL, Interface Definition Library is used for communications between the development environment, the coordination environment and the actual controller and Col. 7 and Col. 11 lines 17-37). Also see Col. 6 lines 53-67, Col. 7 and Col. 8 lines 1-10.

As regards independent claim 48, Tan discloses, *a computer-readable medium, carrying thereon at least one sequence of instructions for controlling a physical process, wherein the execution of said at least one sequence of instructions for controlling a physical process, wherein the execution of said at least one sequence of instructions by at least one processor in communication with at least one controller and at least one component creates a model based controller comprising: a development environment comprising at least one recipe for a process, each said process defined by a plurality of models, with each said model corresponding to at least one process step within said recipe; an execution environment* (Col. 7 lines 25-35) *in operative communication with said development environment, and which execution environment*

comprises an execution platform capable of executing a recipe from said development environment (as regards the controller see Figure 13 "APCDAQ CONTROLLER" Col. 3 lines 25-32 as regards the development environment see Col. 5 lines 44-48 et seq. and Figures 14-20 "LABVIEW" and Col. 11 lines 4-16 and Figure 6 reference 630 "APPLICATION INTERFACE " and reference 632 as regards a plurality of models see Figure 2, Figure 5 reference 506, Col. 6 lines 40-48 and Col. 2 lines 58-67); *a control level in operative communication with said coordination environment and, through said coordination environment, with said execution environment and said development environment, and in operative communication with at least one controller which is capable of controlling at least one component in the execution of at least one process step as defined by said model and communicated by said coordination environment; and wherein* (Figures 13-24 and Col. 4 lines 53-67 and Col. 5 lines 1-9 and Col. Col. 8 lines 29-50 the examiner notes that the IDL, Interface Definition Library is used for communications between the development environment, the coordination environment and the actual controller and Col. 7 and Col. 11 lines 17-37), *said controller sends a control command corresponding to a process step defined by said model communicated to said controller from said model within said development environment through said execution environment and through said coordination environment, to said component, and said component information element is communicated through said coordination environment to said execution environment in which performance of said process step may be varied in accordance with said component information element; and permits the at least one processor to perform the steps of: selecting a recipe associated with a process having at least one process step; generating a model associated with each process step with said process; issuing at least one control command associated with each*

said model, which control command is communicated by said at least one controller to said at least one component; sending, by said at least one component information element to said at least one controller; and communicatively coordinating each said model with the at least one controller, wherein said at least one control command is generated in accordance with the at least one process step, and wherein the at least one process step is varied in accordance with said at least one component information element (Figure 4 "EQUIPMENT INTERFACE #2" and Figures 6 & 7 specifically Figure 6 reference 626 and Figure 8D reference 808 and Figure 14 "DAQDLL" and Figures 15-24 and Col. 13 lines 45-67 and Col. 14 and Col. 15 lines 1-50 and Figure 8A and Col. 12 lines 30-42). Also see Col. 6 lines 53-67, Col. 7 and Col. 8 lines 1-10.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Dependent claims 41-44 are rejected under 35 USC 103(a) as being anticipated by US Patent 6,263,255 *Tan* in view of US Patent 6,726,764 *Mutti.*

As regards dependent claim 41, *Tan* does not expressly disclose, *the model based controller wherein said at least one controller comprises a programmable logic controller.*

Mutti discloses using a programmable logic controller in a model based controller system (Figure 1 and Col. 7 lines 64-67 and Col. 8 lines 1-6).

Tan and *Mutti* are analogous art because they are from the same field of endeavor of model based controller systems.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a programmable logic controller of *Mutti* in the Advanced Process Control system of *Tan*.

The suggestion for doing so would have been to be able to have a programmable logic controller to produce a better semiconductor crystal, which would then allow for the production of a better semiconductor device and allow for tuning of the control parameters during actual production which in turn provides for a more efficient and economical production system, *see Mutti* Col. 3 lines 27-49, it is noted by the examiner that semi-conductor production is one the areas of the manufacturing art that requires the use of model based controllers.

Therefore, it would have been obvious to combine *Mutti* with *Tan* to obtain the invention specified in claims 41-44.

As regards dependent claim 42, *Tan* discloses, *the model based controller wherein said coordination environment further comprises code for enabling communication* (Col. 7 lines 5-10).

As regards dependent claim 43, *Tan* discloses, *the model based controller wherein said coordination environment further comprises code for modifying at least one recipe associated with said controller* (Col. 12 lines 30-42).

As regards dependent claim 44, *Tan* discloses, *the model based controller wherein said code is responsive to at least one of said models* (Figure 24 and Col. 26 lines 13-24).

(10) Response to Argument

Appellants' argued on page 33 of the Appeal Brief submitted on 5/1/2007 that;

The present invention is a model-based control system for an industrial process, not merely a step in an industrial process. That each step in an industrial process is often viewed as a process itself may be confusing. But the process of each process step is often managed by a controller for the equipment employed in that process step. The present invention is a control program intended to work with many such controllers sequentially, managing the entire process, and through the individual controllers, manage each individual process step within the process, according to a set of models for the overall industrial process. Further, the model-based controller of the present invention is not merely intended to direct the machines in which each industrial process step is carried out, but it is also intended to direct the movement of material from one process step to another. Nothing in the prior art even suggests such a possibility.

The Examiner respectfully traverses Appellant's argument, the current claim language fails to disclose the term *"Industrial process"* further, *Tan et al.* clearly teaches that the disclosed methods of programming a process controller can be used for an *Industrial process*, see Col. 2 lines 40-67, which clearly disclose, *semiconductor manufacturing environments*, semiconductor manufacturing is an industrial process. Further and in regards to the teaching of an *Industrial environment Tan et al.* discloses, Col. 2 lines 64-67, "The APC framework integrates with a legacy Manufacturing Execution System (MES) and enables run-to-run control for multiple equipment in semiconductor manufacturing...", clearly *Tan et al.* teaches an *Industrial Process.*

Appellants' further argued on page 33 of the Appeal Brief that;

United States Patent 6,263,255 to Tan and Vines is entitled Advanced Process Control For Semiconductor Manufacturing. The reference shows a framework designed to integrate commercially-available tools for the preparation of semiconductors. It is intended to enable vendors to create framework-compatible products with an open architecture. It is not a controller for an industrial process.

The Examiner respectfully traverses Appellant's argument, *Tan et al.* clearly teaches an *Industrial process,* see Col. 2 lines 64-67, "The APC framework integrates with a legacy

Manufacturing Execution System (MES) and enables run-to-run control for multiple equipment in semiconductor manufacturing...", Manufacturing systems are used for *Industrial Processes*, further the word *Industrial* does not appear in the current claim language and therefore it is improper for the Examiner to read limitations into the claims.

Appellants' further argued on page(s) 33 and 34 of the Appeal Brief that;

United States Patent 6,726,764 to Mutti and Voronknov is entitled Method For Controlling Growth Of A Silicon Crystal To Minimize Growth Rate And Diameter Deviations. The reference discloses a control method for use with a crystal puller for growing a monocrystalline semiconductor crystal from a melt. It is a controller for a process step, not a controller for an industrial process.

The Examiner respectfully traverses Appellants' argument, growing a silicon crystal for the purpose of manufacturing semiconductor's is an *Industrial process*. Further Applicants' claims disclose programming a controller for a process, for example claim 31 discloses, *a model based controller comprising: a development environment comprising at least one recipe for a process each said process defined by a plurality of models, with each said model corresponding to at least one process step within said recipe;*", the language of the claims is for a *single process step* for an *Industrial Process*, *Tan et al.* clearly teaches, a controller being programmed with a recipe for at least one process step, see the following; as regards the controller see Figure 13 "APCDAQ CONTROLLER" Col. 3 lines 25-32 regarding the teaching of a recipe see Col. 1 lines 28-34 "Initially, the recipes were manually downloaded to the equipment by operators/technicians. Subsequently, Factory Control Systems incorporated Equipment Integration (EI) functionality provided automated recipe management and downloaded operations..." *operations* as in a plurality of *processes*, and further and in regards to processes, Col. 2 lines 59 "Advance Process Control (APC) framework..." clearly this disclosed system is

for controlling a process and more specifically, Col. 3 lines 38-48 "The process control software system also includes a processing machine plan routine controlling operations of the processing machine..." and "The process control software system further includes a strategy routine controlling operations of the controller. The strategy routine coordinates activities of the metrology machine and the processing machine plan that span multiple processing steps of the process". Metrology machines are used in industrial processes to measure how well the *process* machines are performing their work.

Appellants' further argued on page 34 of the Appeal Brief that;

> The primary reference, itself, demonstrates the need for such control, in proposing an open architecture for process control which would permit framework-compatible machinery. The inability of the marketplace to overcome the dedication of manufacturers to proprietary control software has thus far resisted the call to an open architecture. The present invention has pursued another route: a model-based controller which can speak to the proprietary-language controller of each process component.

The Examiner respectfully traverses Appellants' arguments, the current claim language fails to teach a model-based controller which can speak to the *proprietary-language controller* of each process component and therefore there is no requirement for the cited prior art references to disclose this feature, further it is improper for the examiner to read limitations into the claims, and further, the Applicant has failed to argue why the limitations are not being met by the reference.

Appellant's further argued on page 34 of the Appeal Brief that;

> It would serve no purpose to argue each element that the Examiner has attempted to find in the primary reference. The rejection is an exercise in the semantics of the language employed, not the reality of the process controlled.

The Examiner respectfully traverses Appellant's arguments, the Examiner is required to give the broadest reasonable interpretation to the claims as presented by Appellants see MPEP section 2111 of the August 2006 Edition, more specifically, the section entitled, "CLAIMS MUST BE GIVEN THEIR BROADEST REASONABLE INTERPRETATION". The semantics of the claim language is the basis for performing the required broadest reasonable interpretation in order to determine the metes and bounds of the claim language as presented by the Appellants. The currently applied prior art references teach a reasonable and broad interpretation of the current claim language as presented.

Appellant's further argued on page 35 of the Appeal Brief that;

> The primary reference remains a proposal for the control of one component in an industrial process and cannot rise to the level of control of an overall process. Certainly, a reference which does not propose to do what the present invention does cannot be said to anticipate the present invention.
>
> That certain hierarchical structures of the control system of the present invention are modeled within the controller of an individual process step is not surprising, for it is with such a structure that a process is controlled. However, in the present claims, the individual controller for a given process element is provided with a control command from an external hierarchical structure, which is then carried out by the controlled component. And the component sends a control information element which is communicated back through the individual component controller to the external hierarchical structure of the model-based control system of the present invention, permitting that process step to be varied.

The Examiner respectfully traverses Appellant's arguments, Appellants have opined that the cited primary reference fails to teach the control of an industrial process without specifically arguing why the limitations are not met by the reference, in this case *Tan et al.* further Appellant's have argued that the current references have not disclosed a teaching in regards to a *hierarchical structures for the control of one component in an industrial process,* the current claim language does not contain the words *hierarchy* or *hierarchical,* further *Tan et al.* does

disclose a *hierarchical* arraignment for performing control of the *industrial process steps* see Figures 2 & 11. Appellants are arguing limitations that are not in the claim language.

Appellants' further argued on page 35 of the Appeal Brief that;

Likewise, the secondary reference, which also shows control of an individual process step, in this case crystallization, cannot add what is not shown in the primary reference, which is overarching external control of an industrial process.

The Examiner respectfully traverses Appellant's argument, the primary reference teaches at least a single process step being performed for an industrial process, in regards to processes, *Tan et al.* Col. 2 lines 59 "Advance Process Control (APC) framework..." clearly this disclosed system is for controlling a process and Figure 1, "IS PROCESS STABLE" "IS PROCESS ON TARGET" and more specifically, Col. 3 lines 38-48 "The process control software system also includes a processing machine plan routine controlling operations of the processing machine..." and "The process control software system further includes a strategy routine controlling operations of the controller. The strategy routine coordinates activities of the metrology machine and the processing machine plan that span multiple processing steps of the process". Metrology machines are used in industrial processes to measure how well the *process* machines are performing their work. There is no need for the secondary reference to teach an individual process step of an industrial process because the primary reference provides this teaching, further Appellants' claim language fails to teach the word *industrial.* Appellants' are arguing language that is not in the claims.

Appellants' finally argued on pages 35 & 36 that;

It is submitted that the system of the present invention and the systems of the cited references...all of the cited references.., are on an altogether different scale. United States Patent 6,263,255 to Tan and Vines is not a control for an industrial process but, in the sense of the present invention, a control of a single

process step within an industrial process. The reference shows process control for the manufacture of semiconductors, not the control of an industrial process for the step-wise production of semiconductors from raw material handling to finished product.

The Examiner respectfully traverses Appellants' arguments, the cited references teach a control of a single process within an industrial process, regarding the Appellants' argument that a teaching is required for a reference to be on the same *scale* as the claimed limitations, the references are on the same scale as required for a reasonably broad interpretation of the current claim language. All of Appellant's arguments are traversed and the applied prior art rejections are maintained for the reason set forth.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Dwin McTaggart Craig

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